technology ■ opportunity

National Aeronautics and Space Administration
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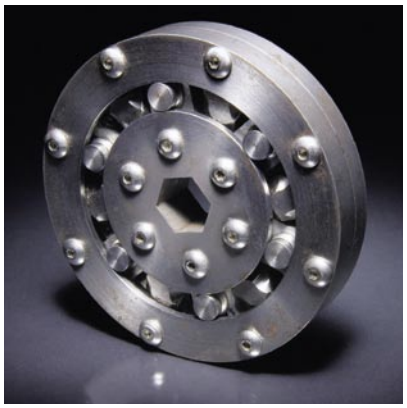
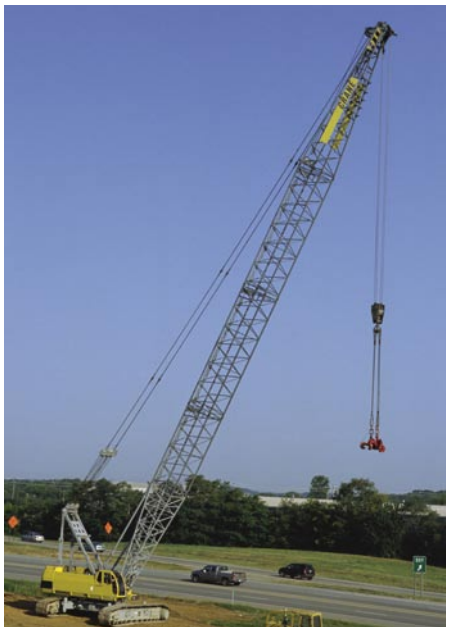
mechanical

Superior One-Way Bearings

Compact and high-strength one-way bearings prevent undesired rotation





NASA Goddard Space Flight Center invites companies to license a superior one-way bearing technology. These new bearings incorporate three-dimensional roller locking sprags and thrust rollers that make them more compact, lightweight, and significantly stronger than conventional one-way bearings. They also incorporate improved lubrication paths and much lower contact stresses, creating a one-way bearing that is more reliable and durable.

Benefits

- **Compact**: 3-D sprags and bearings share common races, creating a simpler and more compact system than traditional one-way bearings.
- **Strong**: The system is four times stronger than conventional one-way bearings and has superior locking capabilities.
- **Smooth operation**: This one-way bearing uses 3-D sprags that act as spacers for the bearings, reducing friction and providing smoother operation.
- **Reliable**: The bearing system stops instantaneously at any position.
- **Simple**: Simple assembly of one-way bearing devices reduces assembly time and potentially cost.
- **Less expensive**: Because the sprags and bearings share common races and use off-the-shelf components this one-way bearing assembly costs less than standard one-way bearings.
- **Durable**: With greatly reduced coupling force and torque acting on the sprags and bearings, the one-way bearing is less prone to wear and is much more durable.

Applications

This unique one-way bearing assembly can be used in any application where a conventional one-way bearing is used.

- **Over-running clutches**: Used in high-performance aircraft, helicopters, tilt-rotor aircraft, automotive drive trains and transmissions, forklifts, cranes, lawn and garden equipment, tools, and small engines (e.g., barring drives, multi-point drives, fan drives)
- **Mechanical indexers**: (e.g., assembly conveyors, printing presses, product packaging)
- **Backstopping**: (e.g., inclined conveyors, bucket elevators, fan drives, rotary pumps, etc.)

Technology Details

This unique one-way bearing assembly combines NASA's 3-D roller locking sprag and thrust roller technologies to create a superior one-way bearing. The bearing assembly places 3-D sprags and thrust rollers in a common race to create a more compact and robust one-way bearing with superior locking capabilities and the ability to handle thrust loads.

How it works

The simple design of this patented one-way bearing incorporates an inner and an outer rotating member coupled by a set of thrust rollers and a set of sprags. It also incorporates sprag preload springs that provide independent preloading to each of the 3-D sprags to ensure each sprag locks into position immediately if the one-way bearing attempts to move in the nonpreferred direction. They also act as a low friction carrier. Two sets of thrust lips are attached to the inner and outer members to enable the thrust rollers to handle thrust (axial) loads.

When the one-way bearing is in operation, the inner and outer members rotate in the preferred direction (with respect to each other). The sprag preload springs ensure that the 3-D sprags are in constant contact with the grooved races of the rotating members and produce little friction as they slide along because the spring preload is very light. These sprag preload springs are also acting as a carrier, separating the thrust rollers from the 3-D sprags.

If the inner and outer rotating members attempt to rotate in the nonpreferred direction, the 3-D sprags lock instantaneously and the inner and outer members are stopped.

Why it is better

This one-way bearing design is stronger and more robust than existing one-way bearings, while also being more compact and lightweight. When compared with one-way bearings using pawls, it is also much quicker in reacting and minimizes backlash. Finally, because its simple design uses off-the-shelf thrust roller bearings and races, it can be produced more quickly and inexpensively.

Licensing and Partnering Opportunities:

This technology is part of NASA's Innovative Partnerships Program, which seeks to transfer technology into and out of NASA to benefit the space program and U.S. industry. NASA invites companies to consider licensing the one-way bearing (GSC-13905-1) technology for commercial applications or becoming a licensed supplier of one-way bearing prototypes.

For More Information

If you are interested in more information or want to pursue transfer or prototyping of this technology (GSC-13905-1), please contact:

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More information about working with NASA Goddard's Office of Technology Transfer is available online:
http://techtransfer.gsfc.nasa.gov